

# **Programming the Basic Atom Microcontroller**

**By Chuck Hellebuyck**

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## **Dedication**

**This book is dedicated to my wife Erin and my children  
Chris, Connor and Brittany.**

**Thanks for letting dad spend all those hours in front of my computer. ■**

**I also dedicate this book to my father who supported me in my early  
years of life when I caught the electronics bug. My father also taught me  
the electrical basics that launched my career. I just wish I could use it to  
design a cure for your cancer.**

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# Introduction

I've been programming Microchip PIC microcontrollers for years but the day I saw the Atom microcontroller and Atom modules from BasicMicro, I knew I had found the greatest platform for the beginner, hobbyist and even professional electronic developer. You cannot read an electronics hobbyist magazine without seeing a project that is microcontroller based. The evolution of the homemade robot has advanced due to the advancements and affordability of microcontrollers. But for some it's still difficult to get started or to find all the right pieces you need to build your own microcontroller development lab.

The Atom micro and Atom modules fill that desire very nicely and give you all the power of a high priced software compiler and development platform in a single, low cost package. The best part is you have numerous options to choose from. From individual chips to small DIP modules to complex full featured development boards, all of them can be programmed with the Atom BASIC language compiler that you can download for free from the BasicMicro website.

This doesn't mean you won't someday advance your skills to needing professional development tools for high volume production such as a multiple PIC version BASIC compiler or assembly, but why overwhelm yourself and your wallet when most users only need what the Atom can deliver.

I've sold many development platforms at a discount from my website with the single purpose of helping others get started programming Microchip PIC microcontrollers. I do this because I love this stuff and want to share it with others. There are many hardware developers that sat out the microcontroller craze because it was such a big step up from the TTL

chips most had been using in their electronic projects. That big step was made smaller because of the Atom.

My first book "Programming PIC Microcontrollers With PicBasic" was written to help individuals learn how to program Microchip PIC microcontrollers with the PicBasic compilers from microEngineering Labs. It was received so well I decided to introduce others to the Atom modules through a second book and this is it. Atoms do not replace PicBasic and PicBasic does not replace the Atom. They are just different levels of stepping-stones that allow users from beginner to advanced deliver custom microcontroller based designs easily and at low cost. In fact, BasicMicro also offers the MBasic Basic Compiler that competes directly with the PicBasic compilers. The Atom and MBasic share the same format and 99% of the same commands. This means learning the Atom could be the catalyst to get you started into this wonderful world of electronic design. You never know, the next PC revolution could be started in your basement lab and if this book or my other writings helped get you started then every finger numbing word I typed was worth it.

If you have any questions regarding this book or the projects in this book, you can usually get me via email at [chuck@elproducts.com](mailto:chuck@elproducts.com). My website is also dedicated to programming Microchip PICs in Basic so you will probably find various helpful tips there as well. I hope this book is everything you hoped it would be and more. Now lets get started learning how to use these Atom modules.

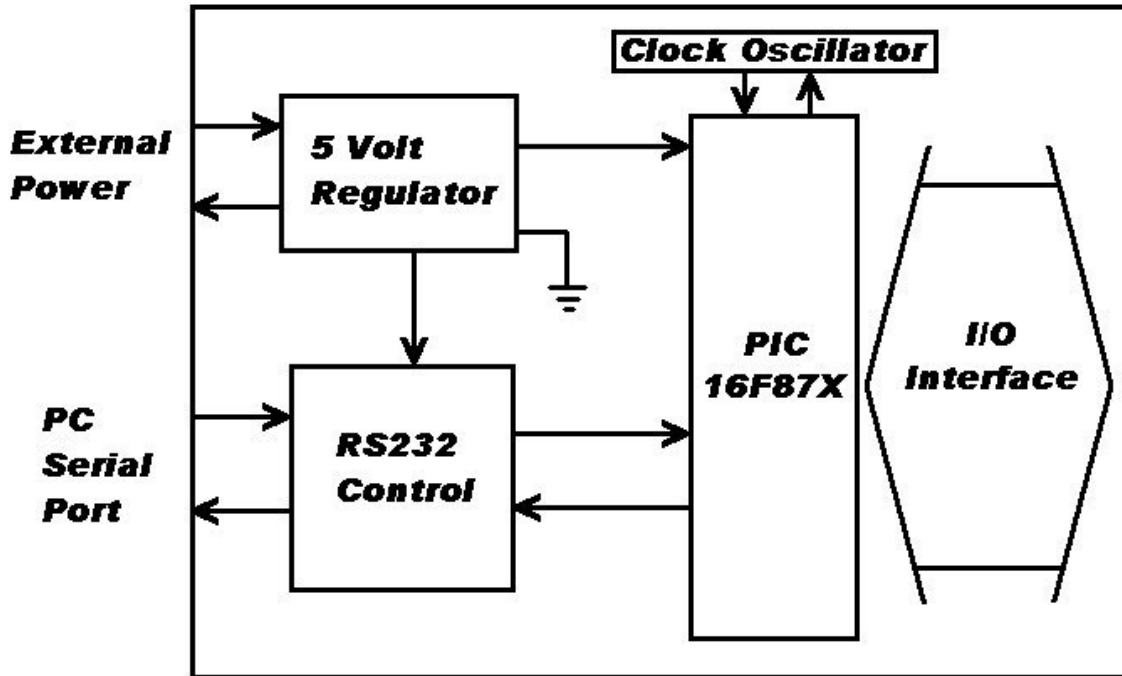
# Chapter 1 – What is an Atom Module

You probably already know what an Atom module looks like and what it basically does otherwise you wouldn't have bought this book. To completely understand all the capabilities of the Atom though, it helps to dive even deeper than what you see and get into the guts of an Atom module and see what makes it tick. This chapter intends to explain all the technical details of the Atom in simple terminology so both beginners and experienced users can benefit.



The Atom module is really a miniature computer control system. It contains a Microchip PIC Microcontroller with the Atom self-programming bootloader software burned in, also known as an Atom interpreter chip or as I often refer to it in this book as the Atom micro. The module also includes a 5-volt regulator circuit, a ceramic resonator clock oscillator, communication circuitry used to download a BASIC program into the Atom's microcontroller memory, and the Input/Output (I/O) interface.

## Atom Module Architecture



There are three versions of the Atom micro, a 40-pin and two 28-pin versions. The 40-pin Atom micro is used in the 40-pin Atom module and BasicBoard development board. The 40-pin Atom micro is built from a 16F877A version of the Microchip PIC. The Atom OEM, and 24 pin modules use the 28 pin version-A Atom firmware chip based on the Microchip PIC 16F876A. The Ultimate OEM and 28-pin modules use the 28-pin version-B Atom firmware chip also based on the PIC 16F876A. The 877A and 876A are identical inside except the 40 pin 16F877 has more I/O pins.